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ABSTRACT

A series of studies was conducted to examine effects of various types of praise and of instructions and primes on the making of a different/new form or the using of an object in a unique way by preschoolers. Generalization of creative behavior within a response set of a given task and from a trained task to an untrained (transfer) task was examined to assess whether there was an overall creativity skill. Effects of a time and material limit were considered, maintenance of a trained behavior was tested, and a flexible creativity code was developed as an individual creativity measure. Tasks included blockbuilding, easel painting, and tool use. Among conclusions drawn were that novel behavior may be influenced by varying types of contingent praise; some generalization of creative behavior does occur; instructions, prompts, and/or exemplars combined with reinforcement may bring about creative behavior; and material and time limits do not seem to adversely influence creativity training. Questions for further research are posed. (CL)

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THE TRAINING OF CREATIVITY AS AN OPERANT IN YOUNG CHILDREN

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THE TRAINING OF CREATIVITY AS AN OPERANT IN YOUNG CHILDREN

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To assure that we all are using the same definition of operant as I present my paper, a review of the term may be in order. Operant refers to a single behavior or a class of related behaviors, a response set. In this paper, operant will be a class of creative behaviors for each different experimental task (e.g., blockbuilding, easel painting, etc.)

In general, an operant is a behavior influenced by : (1) discriminative stimuli that precede the behavior and signal the probability of reinforcement for the behavior, and/or (2) reinforcing stimuli that follow behavior. All behavior and the associated preceding or following stimuli are defined objectively for systematic observation of their occurrence and relationship. Typically, there is no theorizing regarding hypothetical and unmeasurable processes such as overall creativity, cognition, motivation or personality; behavior is viewed and analyzed strictly in terms of functional relationships with the environment. It is the function or consequence (not the physical or verbal attributes) of the stimulus effect on the response that determines whether it is a disciminative stimulus or reinforcing stimulus. Simplistically, the operant learning theory derived from effects of discriminative stimuli and reinforcing stimuli is that behavior that is reinforced increases. Thus, the operant approach provides empirical data which can be evaluated on a purely objective basis by other

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scientists.

It might be mentioned that all operant psychologists do not reject private events, and some do speculate that they occur when environmental training for them, either incidental or planned, has preceded their speculated occurrence. The research to be reviewed here, however, does not train or speculate the occurrence of private events. But, under suggestions for future research this possibility will be covered. And, Dr. Glover later will explore in more depth research designed to train persons to think about how they think as a creativity training procedure.

GENERAL METHODOLOGY

Creative products are commonly defined as novel ones. In keeping with this definition the studies to be presented here defined creative behavior as the making of a new form, or the use of an object in an unique way. For some tasks such as blockbuilding and easel painting the product itself was used as an objective measure that the behavior of making a new form was indeed enacted. This new form could be analyzed relative to the single product in which it occurred--form diversity per product. Or, the new form could be analyzed relative to all the previous products; by this analysis a new form could appear only once during the entire experiment consisting of many sessions. In the case of using an object in a unique way, the actual behavior itself was scored.

Forms and uses in these studies were defined in observable objective terms to facilitate accurate recording of their appearance or occurrence in the experimental tasks. Quality of

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the forms or uses was not evaluated. The use of a quality measure in creativity research is of interest, however, and will be discussed by Dr. Winston.

The number of forms or uses in these studies was assessed first while the preschool child performed the task before intervention. Then the change, if any, between nonintervention and intervention was measured. Noninterventions and interventions were sequenced systematically to demonstrate experimental control in three basic designs to be pointed out as the studies are reviewed.

The subjects attended the Edna A. Hill Child Development Laboratory Preschools in the Department of Human Development and Family Life at the University of Kansas. They were typical children with one quarter of them from minority groups and one quarter from a low socio-economic group. It will be helpful to keep this information in mind for a later comparison with the demographics of the subjects in Dr. Pinkston's research.

Creative behavior in these studies was measured relative to a particular child's previous performance on a given task. Therefore, an individual analysis design was used which examined a singular pattern of behavior and individualized training. This course of individual examination is often the first step in functionally analyzing a class of behavior. A statistical comparison of groups may be considered a later step in sequential analysis of a behavioral class. Though group behavior does camouflage individual differences, it does supply normative data useful for working with children in groups as well as for cultural comparisons. Dr. Winston in his presentation will

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discuss the advisability of individual or group data for younger and older children.

RESEARCH STUDIES

Taken together the studies in this series demonstrated the effects of various types of praise (functionally shown to be reinforcing stimuli following creative behavior), and various types of instructions and primes (functionally shown to be discriminative stimuli preceding creative behaviors), on the making of a different/new form or the using of an object in a unique way. Generalization of creative behavior within a response set of a given task and from a trained task to an untrained (transfer) task was examined to assess whether there seemed to be an overall creativity skill. Creative behavior was measured with and without a materials limit and with and without a time limit to judge if these variables increased or decreased the effects of training. Maintenance of trained behavior was tested to determine to what extent the effects lasted. Finally, a flexible creativity code was developed as an individual creativity measure.

Praise

Goetz and Baer (1973): Blockbuilding

Design: Combination multiple baseline and reversal.

Subjects: Three.

Intervention: Descriptive verbal praise contingent on each different form in a single blockbuilding product.

Results: Form diversity per product increased with descriptive verbal praise contingent on difference and decreased

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when contingent on sameness.

Side Effect: New forms appeared for the first time in study, considering all previous products, at higher rates during reinforcement for form diversity per product.

Goetz and Salmonsor (1972): Easel Painting

Design: Withdrawal.

Subjects: Three.

Intervention: General praise for form diversity per product or descriptive praise for form diversity per product.

Results: Descriptive praise resulted in higher form diversity per product than general praise.

Side Effect: No systematic increase of new forms associated with either type of reinforcement. Across the study the time decreased for painting even though later conditions showed increased form diversity.

Romero, Holt, Stella, Baer and Etzel (1978): Colored Cubes (Manipulation of single layer of colored cubes within square-shaped container)

Design: Multiple baseline.

Subjects: Four.

Intervention: Descriptive verbal or general praise contingent on making surface shapes of triangle and line.

Results: Descriptive praise increased triangle and line more then general praise. Complexity of designs maintained during fading of reinforcement.

Side Effect: Diamond and arch were side effects of training triangle and line. Throughout training overall appearance of the

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designs in the set of colored cubes appeared to be more complex, novel, and symmetrical in comparison to baseline designs.

Goetz (1981): Blockbuilding

Design: Multiple baseline.

Subjects: Nine.

Intervention: Descriptive verbal reinforcement contingent on each new form appearing for the first time in the entire study--minimal descriptive praise.

Results: Seven of nine children's new forms increased. One child's data suggested an increase. One child showed no effect.

Side Effect: Four children's data showed corresponding increases in form diverity per product when new forms appearing for the first time throughout the study were reinforced. One child's data suggested an increase in form diversity. Four children's form diversity did not change.

Primes and Instructions

Figgs, Dunn and Herbert (1971); Blockbuilding

Design: Reversal.

Subject: One.

Intervention: Using a different prime before child builds in each condition.

1. Prime for suggestions (Can you build a farm today?).
2. Prime for difference (Build something different today.).
3. Prime for repeats (Can you build another one like that?)
4. Prime to use all blocks (Let's use all the blocks today.).

Results: Most effective priming technique for increasing form diversity in a single construction was the suggestion prime.

Figgs and Herbert (1971): Blockbuilding

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Design: Reversal.

Subjects: Two.

Intervention: Various types of possible discriminative stimuli (modeling, training and primes) and possible reinforcing stimuli (descriptive praise) were used separately and in combination.

Results: A combination of primes for difference and descriptive praise for difference was the most effective in increasing form diversity.

Generalization

Holman, Goetz and Baer, Experiment 1 (1977): Easel Painting to Blockbuilding

Design: Withdrawal design for task 1 (easel painting) with continued baseline for task 2 (blockbuilding).

Subjects: Two.

Intervention: Descriptive verbal praise contingent on form diversity in a single product.

Results: Praise in easel painting increased form diveristy per picture. Form diversity in blockbuilding increased when form diversity was praised in easel painting.

Side Effect: New forms in easel painting appeared when form diversity in easel painting increased. New forms in blockbuilding did not increase.

Holman, Goetz, and Baer, Experiment 2 (1977): Blockbuilding, Lego Building, Easel Painting and Felt-Pen Design

Design: Multiple baseline across three children with training in one task (felt-pen drawing), and with each subject

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having continued baselines on three other tasks (easel painting, blockbuilding and Lego building).

Subjects: Three.

Intervention: Descriptive verbal praise contingent on form diversity in felt-pen drawing.

Results: Descriptive praise increased form diversity per product and new forms appearing for the first time in entire study in felt-pen drawing. Generalization from felt-pen drawing to the topographically similar task of easel painting was shown clearly for two subjects, and to some extent for the third, both in form diversity and new forms. Generalization to the topographically dissimilar tasks of blockbuilding and Lego building was much less evident, though for one child it was weakly correlated. One child who later recieved praise for form diversity in Lego building showed no generalization to it's topographically similar task of blockbuilding.

Parsonson and Baer (1978): Tools (Hammer, Shoelace and Container)

Design: Multiple baseline.

Subjects: Five.

Intervention: The task was to find a substitute to replace a specifically designed, but currently unavailable, tool ordinarily used to solve a problem. Training consisted of exemplars within a single class of tools combined with praise for improvisation.

Results: With exemplars all five children showed increased generalized improvisation within the trained class, but not across classes.

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Material and Time Limits

Goetz and Baer (1973): Blockbuilding

Two of three children had unlimited use of the number of blocks built. The third child was limited to 53 blocks. The third child's data was similar to the other two's (both form diversity and new forms increased) suggesting that this limit on materials did not adversely affect the results. All other blockbuilding studies reviewed in this paper had a limit of approximately 50 blocks and still had positive results.

Fallon and Goetz (1975): Felt-Pen Drawing

In a multiple baseline design three children successively received descriptive verbal praise contingent on form diversity in felt-pen drawing. Form diversity and new forms increase for all children. A 3-minute time limit was used for each drawing. Results were similar to the easel painting task in Goetz and Salmonson (1972) and the painting and drawing task in Holman et al. (1977) generalization studies in which time limits were not imposed, thus suggesting a time limit does not hinder this type of training.

Maintenance

Romero et al. (1978): Colored Cubes

Results maintained over five days of thinning reinforcement.

Parsonson and Baer (1978): Tools

Results maintained during immediate probes after training.

Fallon and Goetz (1975): Felt-Pen Drawing

Holman et al., Experiment 2 (1977): Blockbuilding, Lego Building, Easel Painting and Felt-Pen Drawing

Both these studies reported maintenance of increased form

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diversity several months after training for those children who had received many training trials (8-12) in felt-pen drawing, but not for those who had received fewer trials (5-6).

A Flexible Creativity Code

Elliott and Goetz (1971): Blockbuilding

Design: Withdrawal.

Subject: One.

Intervention: Descriptive verbal praise contingent on form diversity per product using a base code of 20 forms plus other different forms which the subject devised in the course of building.

Results: Praise increased form diversity.

SUMMARY AND DISCUSSION

This series of studies presents seven tentative conclusions:

1. Novel behavior may be influenced by varying types of contingent praise. Although general praise will increase novel behavior, specific praise will increase it more, or at least more quickly.
2. Some generalization of creative behavior does occur. For example, the appearance of completely new forms, considering all previous products, seems to be a frequent side effect of programs aimed merely at form diversity within a single product. That is, generalization along a gradient underlying form inventions with a given task (a response set) does occur. But, generalization to a different unrelated task is weak. Therefore, it seems an overall

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creativity skill may not exist, but rather that the same type of creative response is used in similar and related tasks. The weakness, however, in generalization might reflect training across an insufficient number of tasks to develop an overall skill, or it might reflect an inadequate type of training.

3. Even minimal reinforcement contingent on new forms appearing for the first time across products (usually a low-rate behavior), rather than maximal reinforcement contingent on form diversity (usually a high-rate behavior) often increases new forms.

4. Instructions, prompts, and/or exemplars combined with reinforcement may bring about creative behavior.

5. Material and time limits do not seem to adversely influence creativity training.

6. Trained creativity is maintained immediately afterwards and sometimes for several months. A direct relationship seems to exist between the number of training sessions and long-term maintenance.

7. A flexible code for measuring creativity may be used to individualize training.

Not only are these conclusions tentative, but there are many issues yet to be addressed in the training of preschool children's creative behaviors as operants:

1. Can the types of creativity examined in this paper be trained in a group setting?

2. Can peers function as trainers?

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3. What are the outer limits of the long-term effects of the operant training for creativity?

4. Can an intermittent schedule of reinforcement increase novel responding?

5. Can delayed reinforcement increase novel responding?

6. Can children be trained in self-control management to develop novel behavior in the experimental tasks in this series of studies? Again, I am looking forward to hearing Dr. Glover explore self-management research in creativity to train persons to think about how they think.

7. Can analagous training be developed for adults in the areas of creativity appropriate to their life style--creative leadership and creative supervision?

The limitation of this series of studies are recognized. Creative behavior has been examined narrowly in terms of form diversity. One might question whether form diversity in itself is creative. Certainly museums display works of art with very few forms, such as Barnett Newman, Tony Smith and Barbara Hepworth; these works of art are judged as creative for their style, not form diversity. Objective definitions of style would be valuable for this type of research. And, of course, social validation is a consideration in this area.

Perhaps, for the present, one should not be presumptuous in reviewing these studies by saying children's creative behaviors were increased, but rather that form diversity was increased.

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One exception to considering only form diversity is the Parsonson and Baer (1978) study which examined improvisation as an operant. This latter study may be viewed as creative problem solving which does need to be explored further in operant research.

Another limitation in this research is the study of creative behavior in isolation, rather than as it relates to a child's behavioral history. We need to know to what extent the family in the home, the teachers in the school and the people of our society are presenting discriminative stimuli and reinforcing stimuli for creative behavior in children. Each child's behavioral history certainly would influence the results of creativity training for that child. At this point, this series of studies stands with many limitations, but hopefully offers some insight into the development of creative behavior.

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FOOTNOTE

[1] This paper has been based on the following article:

Goetz, E.M. (1982). A review of functional analyses of preschool children's creative behaviors. Educational and Treatment of Children, 5, No. 2, 157-177.

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